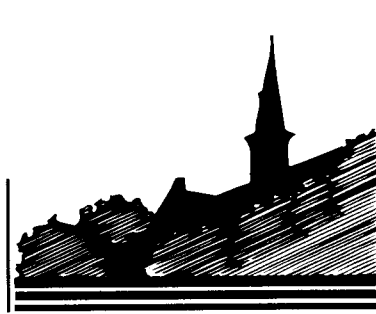


# City Of Lake Mills

307 N. CP Avenue  
Lake Mills, WI 53551  
(920) 648-4026  
FAX: (920) 648-8649



3000

January 29, 2001

Jim Loock, Chief Electric Engineer  
Public Service Commission  
610 N. Whitney Way  
P.O. Box 7854  
Madison, WI 53707-7854

RECEIVED  
JAN 30 PM 3:22  
DIVISION OF PUBLIC UTILITIES

RE: In the Matter of Filing Plans for Appropriate Inspection and  
Maintenance, PSC Rule 113.0607.

Dear Mr. Loock:

Enclosed for filing are 3 copies of Lake Mills Light & Water's Preventative Maintenance Plan detailing inspection maintenance schedules, condition rating criteria, corrective action schedules, record keeping procedures and report filing schedules as documented in this rule.

Very truly yours,

A handwritten signature in cursive script, appearing to read "T. Whitcomb".

Ted Whitcomb  
Utility Superintendent

Enclosures

**RECEIVED**

JAN 30 2001

Electric Division

# PREVENTATIVE MAINTENANCE PLAN

## Lake Mills Light & Water

**FILING DEADLINE**

**FEBRUARY 1, 2001**

December 19, 2000

Ted Whitcomb

307 N. CP Avenue

Lake Mills, WI 53551

(920) 648-4026

twhitcomb@WPPIsys.org

**RECEIVED**

JAN 30 2001

Electric Division

This plan was prepared by the MEUW work group for PSC Rule 113.0607 for use by the 82 municipal electric utilities in Wisconsin and endorsed by PSC staff as meeting the requirements of Rule PSC 113.0607.

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## **FORMS**

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## **I. Preventative Maintenance Plan**

The PSC 113.0607 rule reads;

Appropriate inspection and maintenance: system reliability.

(1) PREVENTATIVE MAINTENANCE PLAN. Each utility or other person subject to this chapter, including persons who own electric generating facilities in this state who provide service to utilities with contracts of five years or more, shall develop and have in place its own preventative maintenance plan. This section is applicable to electric generating facilities as set forth at s. 194.491(5)(a)(1), Stats. Each plan shall include, among other things, appropriate inspection, maintenance and replacement cycles where applicable for overhead and underground distribution plant, transmission, generation<sup>1</sup>, and substation facilities.

(2) CONTENTS OF THE PLAN. (a) *Performance standard.* The Preventative Maintenance Plan shall be designed to ensure high quality, safe, and reliable service, considering: cost, geography, weather, applicable codes, national electric industry practices, sound engineering judgment and experience.

- 1 *PSC staff interpretation is that generation applies to individual generators equal to or greater than 50 MW.*

## **II. Inspection Schedule and Methods:**

The purpose of this plan is to maintain or improve the electrical system reliability with the objective of increased municipal loyalty and satisfaction from our constituents. The goals are to meet and exceed the schedules established in this plan.

Exception reporting (inspected equipment not in good condition) will be the method of documentation on all inspection forms.

The scope of this plan is traditional and uses proven maintenance techniques. Unique operating and maintenance philosophies have not been considered. Also, manufacturer defects will be dealt with as they are communicated to this utility.

| SCHEDULE:                     | MONTHLY  | ANNUAL   | EVERY<br>5 YEARS |
|-------------------------------|----------|----------|------------------|
| Transmission (≥9Kv and above) |          | <b>X</b> | <b>X</b>         |
| Substations                   | <b>X</b> | <b>X</b> |                  |
| Distribution (OH & UG)        |          |          | <b>X</b>         |

The inspection of Distribution facilities will be by individual substation circuits on a 5-year cycle such that the entire system will be inspected every 5 years. Inspector instructions for inspecting all facilities and forms are included with the plan.

**METHODS:** Five criteria groups will be used to complete the inspection of all facilities.

1. IR – infrared thermography used to find poor electrical connections and/or oil flow problems in equipment.
2. RFI - Radio Frequency Interference, a byproduct of loose hardware and connections, is checked using an AM radio receiver.
3. SI – structural integrity of all supporting hardware including poles, crossarms, insulators, structures, bases, foundations, buildings, etc.
4. Clearance – refers to proper spacing of conductors from objects, trees and other utility cables.
5. EC – equipment condition on non-structural components such as circuit breakers, transformers, regulators, reclosers, relays, batteries, capacitors, etc.

### **III. Condition Rating Criteria:**

This criterion, as listed below, establishes the condition of a facility and also determines the repair schedule to correct deficiencies.

- 0) Good condition
- 1) Good condition but aging
- 2) Non-critical maintenance required – normally repair within 12 months
- 3) Priority maintenance required – normally repair within 90 days
- 4) Urgent maintenance required – report immediately to the utility and repair normally within 1 week

### **IV. Corrective Action Schedule**

The rating criteria as listed above determine the corrective action schedule.

### **V. Record Keeping**

All inspection forms and records will be retained for a minimum of 10 years. The inspection form contains all of the required critical information i.e. inspection dates, condition rating, schedule for repair and date of repair completion.

### **VI. Reporting Requirements**

A report and summary of this plan's progress will be submitted every two years with the first report due to the Commission by February 1, 2003. The report will consist of a letter documenting the percent of inspections achieved compared to the schedule and a description of maintenance achieved within the scheduled time allowance.

## **VII DISTRIBUTION – OVERHEAD INSPECTION GUIDE**

### **STRUCTURE**

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage - Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires
- U Guard/Conduit Condition

### **EQUIPMENT**

- Transformers
  - ✓ Oil Leaks
  - ✓ Bushing Condition
  - ✓ Grounding/Bonding
- Capacitors
  - ✓ Fuses Blown
  - ✓ Bushing Condition
  - ✓ Oil Leaks
  - ✓ Tank Bulged
  - ✓ Switches, Oil, Vacuum
  - ✓ Control Conduit/Wiring
  - ✓ Grounding/Bonding
- Switches - GOAB, Inline, Disconnect
  - ✓ Insulator Condition
  - ✓ Operating Handle/Locks
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number
- Cutouts
  - ✓ Insulator Condition
  - ✓ Fuse Size Tag

## **VII DISTRIBUTION – OVERHEAD INSPECTION GUIDE (con't)**

### **EQUIPMENT (CON'T)**

- Arrestor
  - ✓ Insulator Condition
  - ✓ Connections
  - ✓ Ground Lead Disconnection
- Cable Terminators
  - ✓ Insulator Condition
  - ✓ Grounding/Bonding

### **CLEARANCES**

- Ground Line
- Buildings, Bridges, Swimming Pool, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Transmission Lines
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
  - ✓ Clearance From Line
  - ✓ Vines on Poles
  - ✓ Danger Trees

### **INFRARED SCAN**

- Main Three-Phase Feeders
- Priority Overhead Transformer Banks
  - ✓ Bushing Connectors Primary
  - ✓ Bushing Connectors Secondary
  - ✓ General Tank Heating
- Current & Voltage Transformers if Applicable

### **RFI CHECK**

- OH system with AM radio as each circuit is inspected



Date \_\_\_\_\_ Inspected by \_\_\_\_\_ Sub \_\_\_\_\_ Ckt \_\_\_\_\_

**Ckt**\_\_\_\_\_

Ckt

**Sub**

Inspected by:

Date: \_\_\_\_\_

RM

OFF

3

EAL

VER

| MAP AREA                | STRUCTURE               | EQUIPMENT | CLEARANCE | COMMENTS   | Date Item Corrected | Corrected By |
|-------------------------|-------------------------|-----------|-----------|--|---------------------|--------------|
| LOCATION                | Pole Condition/Leaning  |           |           | Rating Criteria<br>-----<br>0) Good Condition<br>1) Good Condition but aging<br>2) Non-critical Maintenance Required<br>3) Priority Maintenance Required<br>4) Urgent Maintenance Required |                     |              |
|                         | Crossarm Condition      |           |           |  |                     |              |
|                         | Insulators, DE, Pin     |           |           |  |                     |              |
|                         | Soil Conditions         |           |           |  |                     |              |
|                         | Pole Steps              |           |           |  |                     |              |
|                         | Grounds Intact, Molding |           |           |  |                     |              |
|                         | Down Guys and Markers   |           |           |  |                     |              |
|                         | Guy Bond, Insulator     |           |           |  |                     |              |
|                         | Signs, Loc#, Warning    |           |           |  |                     |              |
|                         | Customer Equipment      |           |           |  |                     |              |
|                         | Conductor and Ties      |           |           |  |                     |              |
|                         | U'Guard/Conduit Cond    |           |           |  |                     |              |
|                         | RFI Check               |           |           |  |                     |              |
|                         | Transformer             |           |           |  |                     |              |
|                         | Switches                |           |           |  |                     |              |
|                         | Cutouts                 |           |           |  |                     |              |
| Arresters               |                         |           |           |  |                     |              |
| Terminators             |                         |           |           |  |                     |              |
| Street Light            |                         |           |           |  |                     |              |
| Tree Trimming           |                         |           |           |  |                     |              |
| Ground Line Clearances  |                         |           |           |  |                     |              |
| Building Clearances     |                         |           |           |  |                     |              |
| Streets, Roads, Alleys  |                         |           |           |  |                     |              |
| Communication Clearance |                         |           |           |  |                     |              |

## **VIII DISTRIBUTION – UNDERGROUND INSPECTION GUIDE**

### **STRUCTURAL (Exterior & Interior) Transformer, Primary Pedestal, Secondary Pedestal, Switchgear.**

- Enclosure Condition
- Level/Leaning
- Security
- Grade/Accessibility (Shrubs, Customer Facilities, Fill/Excavation)
- Numbering
- Voids/Gaps
- Signage - Location Number, Warning Sign
- Pad/Vault Condition

### **EQUIPMENT**

- Transformers
  - ✓ Oil Leaks
  - ✓ Bushing Condition
  - ✓ Grounding/Bonding
  - ✓ Elbows
  - ✓ Arrestors
  - ✓ Feed-Through
  - ✓ Cable Condition
  - ✓ Secondary Connections
- Primary Pedestals
  - ✓ Elbows
  - ✓ Junction Condition
  - ✓ Grounding/Bonding
- Secondary Pedestals
  - ✓ Secondary Connections
- Switches – URD Switchgear
  - ✓ Insulator Condition
  - ✓ Operating Handle Security
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number/Fuse Size & Number

### **INFRARED SCAN and RFI CHECK**

- Main Three-Phase Feeders (Risers & Switchgear)
- Priority URD Transformer Banks
  - ✓ Bushing Connectors Primary
  - ✓ Bushing Connectors Secondary
  - ✓ General Tank Heating

## IX SUBSTATION - MONTHLY INSPECTION GUIDE

### TRANSFORMER MAIN TANK:

- Oil in bushings
- Bushing and arrestor porcelain
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Oil leaks
  - ✓ Main tank
  - ✓ Sample valves
  - ✓ Radiators
- Radiator bank
  - ✓ warm on top, cool at bottom
- Tank pressure
- Tank oil level
- Temperature gauge
- Cooling fans

### TRANSFORMER LTC or VOLTAGE REGULATORS:

- Tank oil level
- Drag hand positions
- Cabinet light
- Operation count
- Tank pressure
- Cabinet heater
- Cabinet contamination

### TRANSMISSION CIRCUIT BREAKERS:

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Line and load side disconnect switches
  - ✓ Properly labeled
  - ✓ Aligned properly
- Handles grounded
- Emergency trip button
- Air / Oil compressors
- Air / Oil pressure gauge
- Spring operated mechanism
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

## **IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)**

### **FEEDER CIRCUIT BREAKERS / RECLOSERS**

- OPEN/CLOSED indicator
- CHARGED/DISCHARGED indicator
- Cabinet light
- Cabinet heater
- Operations counter
- Bushings and supports
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Line and load side disconnect switches
  - ✓ Labeled properly
  - ✓ Aligned properly
  - ✓ Handles grounded
- Emergency trip button
- Oil level gauge
- Tank oil leaks
- Reset switch
- Cabinet contamination
- Vents clean
- Gas pressures for GCBs

### **HIGH AND LOW VOLTAGE BUSS WORK:**

- Bushing, insulator, arrester, and support insulators
  - ✓ Chips or cracks
  - ✓ Rust or dirt
- Bird nests
- Potential transformers bushings
  - ✓ Cracks or chips
  - ✓ Rust or dirt
- Cable terminators
  - ✓ Leaking fluid
  - ✓ Cracks or chips

### **MANUAL SWITCHES:**

- Properly labeled
- Ground connections
- Positioning and alignment
- Bushing and support insulators
  - ✓ Cracks or chips
  - ✓ Rust or dirt

### **MOTOR OPERATED SWITCHES:**

- OPEN/CLOSED indicator
- Properly labeled
- Cabinet heater
- Operations counter

## **IX SUBSTATION - MONTHLY INSPECTION GUIDE (con't)**

### **CONTROL HOUSE/MISCELLANEOUS:**

- Clock displays proper time
- AC/DC load center breakers
- Room temperature
- Rodents
- Panels labeled properly
- Panel lights
- Annunciator panel
- Panel meters
- SCADA system RTU
- SCADA alarms
- Position indicators agree
- Relay target information
- Emergency contact directory & dial tone for phone
- Safety Equipment

### **BATTERY:**

- Liquid levels
- Proper float voltage on charger and battery
- Specific gravity in pilot cell
- Personal Protective Equipment
- Connection corrosion
- Leaking cells
- Dated solution in eyewash station

### **YARD AND FENCE:**

- Fire extinguisher charged
- Fence ground connections
- Fence secured
- Security and emergency lights
- Site base and grade
- Standing water
- Warning signs

## **X Substation - Annual Inspection Guide**

- Check equipment for level
- Check condition of concrete pads
- Perform oil and DGA analysis
- Battery
  - ✓ Intercell strap resistance
  - ✓ Individual cell voltages
  - ✓ Cell specific gravity
- Nameplate legible
- Equipment paint condition
- Proper equipment ID labels
- IR / RFI scans and checks

## **XI TRANSMISSION – ANNUAL INSPECTION GUIDE**

### **STRUCTURE**

- Pole Condition
- Pole Leaning
- Crossarm Condition
- Insulators, Deadend, Pin
- Excess Fill or Soil Removal
- Pole Steps
- Grounds Intact
- Ground Molding
- Down Guys
- Guy Markers
- Guy Bonding/Insulator
- Signage - Location Number, Warning Sign
- Customer Equipment
- Conductor
- Tie Wires

### **EQUIPMENT**

- Switches - GOAB, Disconnect
  - ✓ Insulator Condition
  - ✓ Operating Handle/Locks
  - ✓ Linkage
  - ✓ Grounding/Bonding
  - ✓ Switch Number
- Arrestor
  - ✓ Insulator Condition
  - ✓ Connections

### **CLEARANCES**

- Ground Line
- Buildings, Bridges, Etc.
- Communications Facilities
- Fuel Tanks
- Other Electric Utilities
- Over Streets, Roads, Alleys, Highways
- Tree Trimming
  - ✓ Clearance From Line
  - ✓ Vines on Poles
  - ✓ Danger Trees

## **XI TRANSMISSION – ANNUAL INSPECTION GUIDE (con't)**

### **RFI CHECK**

- Splices
- Connectors
- Dead Ends
- Switches
- Structures

## **XII TRANSMISSION – 5 YEAR INSPECTION GUIDE**

### **IR SCAN**

- Splices
- Connectors
- Dead Ends
- Switches



## Date \_\_\_\_\_ Inspected by \_\_\_\_\_ Sub \_\_\_\_\_ Ckt \_\_\_\_\_

## MEUW - Preventative Maintenance Plan Format